

CLAIMS

1 1. A method for correcting non-uniformity in luminance of an image generated by
2 a projector and displayed obliquely on a surface, wherein the projector has a plurality of
3 pixels for use in generating images and each projector pixel subtends to a corresponding
4 projected area on the screen, the method comprising the steps of:

5 identifying the projector pixel that subtends to the largest projected area on the
6 screen;

7 determining a ratio between the projected area of each pixel and the largest pro-
8 jected area;

9 organizing the ratio determined for each pixel into an attenuation array;

10 modifying luminance information of an input image received by the projector by
11 the ratios of the attenuation array; and

12 utilizing the modified luminance information to drive the projector such that the
13 image produced on the screen is uniform in luminance.

1 2. The method of claim 1 further comprising the step of generating a homography
2 that maps between a first coordinate system relative to the projector, and a second coor-
3 dinate system relative to the surface, and wherein the step of identifying is based on the
4 first projector to surface homography.

1 3. The method of claim 2 wherein
2 the first coordinate system includes an x_p coordinate and a y_p coordinate;
3 the projector to surface homography includes parameters h_7 , h_8 and h_9 ;
4 the step of identifying comprises the step of calculating a value, w , for each pixel
5 represented by coordinates x_p , y_p wherein w is equal to $|h_7x_p + h_8y_p + h_9|$ and determin-
6 ing which projector pixel has the smallest calculated value of w .

1 4. The method of claim 2 wherein the step of generating the projector to surface
2 homography comprises the steps of:

3 capturing one or more images produced by the projector on the screen with a
4 camera;

5 determining the coordinates of each of the at least four projector pixels in the first
6 coordinate system, which is relative to the projector, and in a third coordinate system that
7 is relative to the camera; and

8 processing the coordinates of the at least four projector pixels in both the first and
9 third coordinate systems to generate the projector to surface homography.

1 5. The method of claim 4 wherein the camera has an optical axis that is perpen-
2 dicular with the surface in all planes, and the step of generating the projector to surface
3 homography comprises the steps of:

4 generating a projector to camera homography based upon the determination of the
5 coordinates of the at least four projector pixels in both the first and third coordinate sys-
6 tems; and

7 equating the projector to camera homography with the projector to surface homo-
8 graphy.